

CRE and Novel Resistance Surveillance in Michigan

Sara McNamara, MPH, MT(ASCP), CIC

Surveillance for Healthcare-Associated and Resistant Pathogens Unit

Michigan Department of Health and Human Services

CRE Surveillance in Michigan

- CRE Surveillance and Prevention Initiative
- CP-CRE Communicable Disease Reporting
- MDHHS Bureau of Laboratories/Antibiotic Resistance Laboratory Network Testing

CP-CRE Communicable Disease Reporting

CP-CRE Reporting

- Reportable disease in Michigan starting January 2018
- CP-CRE cases reported using the Michigan Disease Surveillance System (MDSS)
- Reporting requirements:
 - Any isolate of *Klebsiella spp.*, *E. coli*, or *Enterobacter spp.* that demonstrates:
 - Carbapenemase production by a **phenotypic test** (e.g., mCIM, CarbaNP)
 - Carbapenemase resistance mechanism by a **molecular test** (e.g., PCR, Xpert Carba-R)
 - If a laboratory is unable to detect CP-CRE, then isolates resistant to one or more carbapenems meeting the following minimum inhibitory concentration (MIC) criteria:
 - ≥ 4 mcg/ml for Meropenem, ≥ 4 mcg/ml for Imipenem, ≥ 4 mcg/ml for Doripenem, or ≥ 2 mcg/ml for Ertapenem

CP-CRE Cases Reported to MDSS

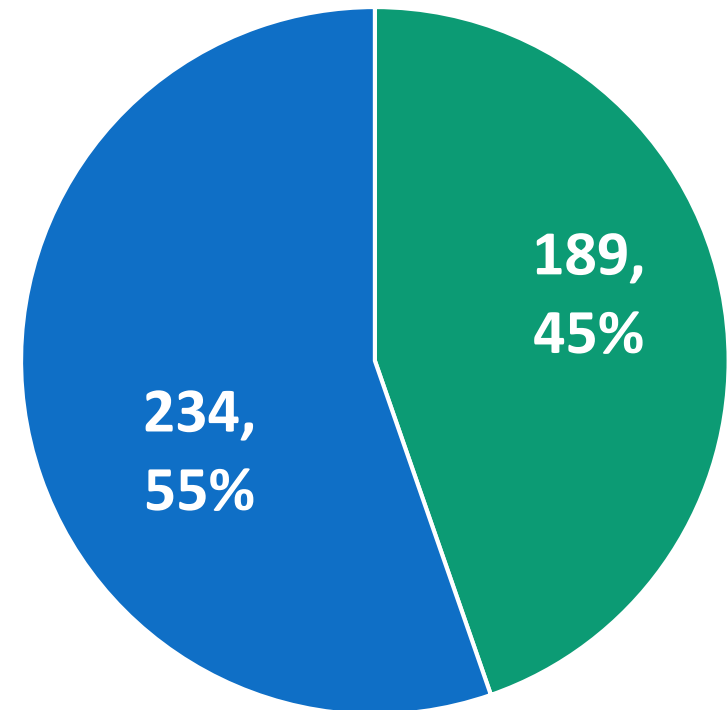
Jan 2018 – Mar 2019

Confirmed CP-CRE

- *Klebsiella spp., E. coli, Enterobacter spp.*
 - Positive **phenotypic test** OR
 - Positive **resistance mechanism**

Suspect CP-CRE

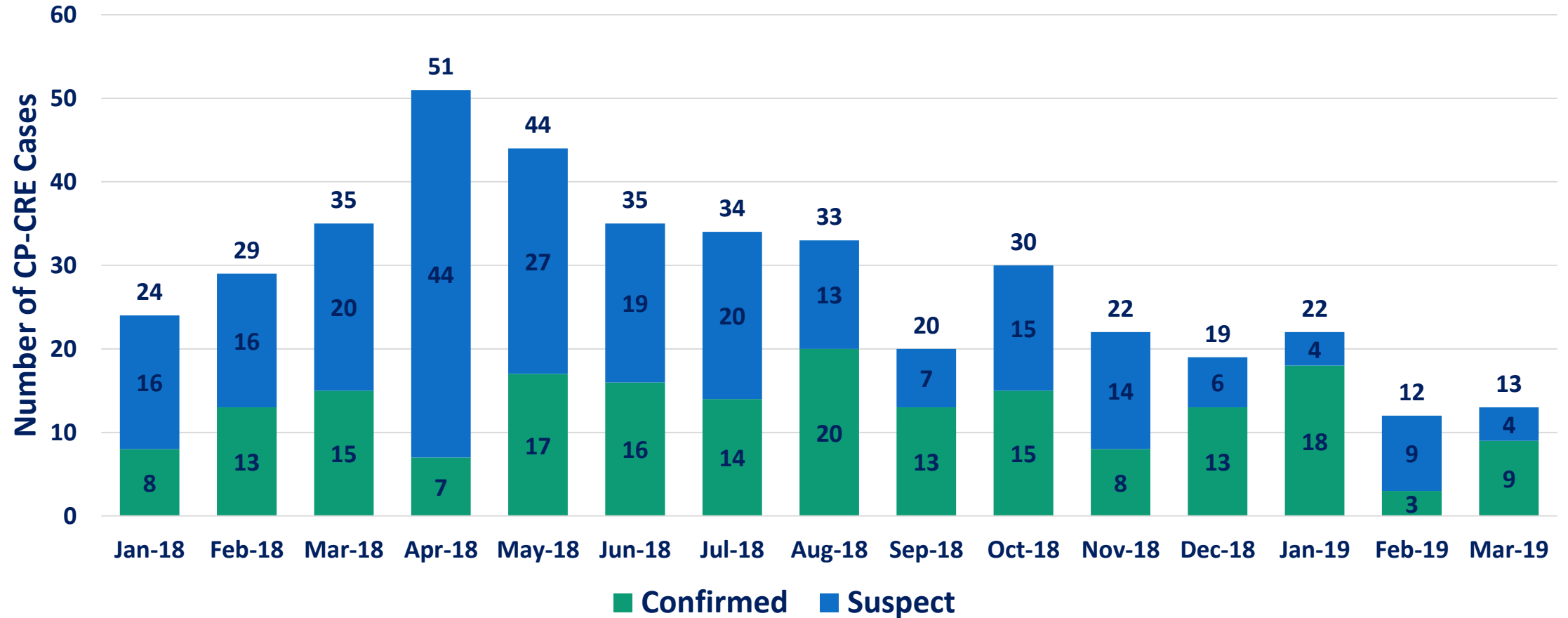
- *Klebsiella spp., E. coli, Enterobacter spp.*
 - Resistance to at least 1 carbapenem
 - No phenotypic or molecular testing done



■ Confirmed ■ Suspect

CP-CRE Cases Reported to MDSS

Jan 2018 – Mar 2019



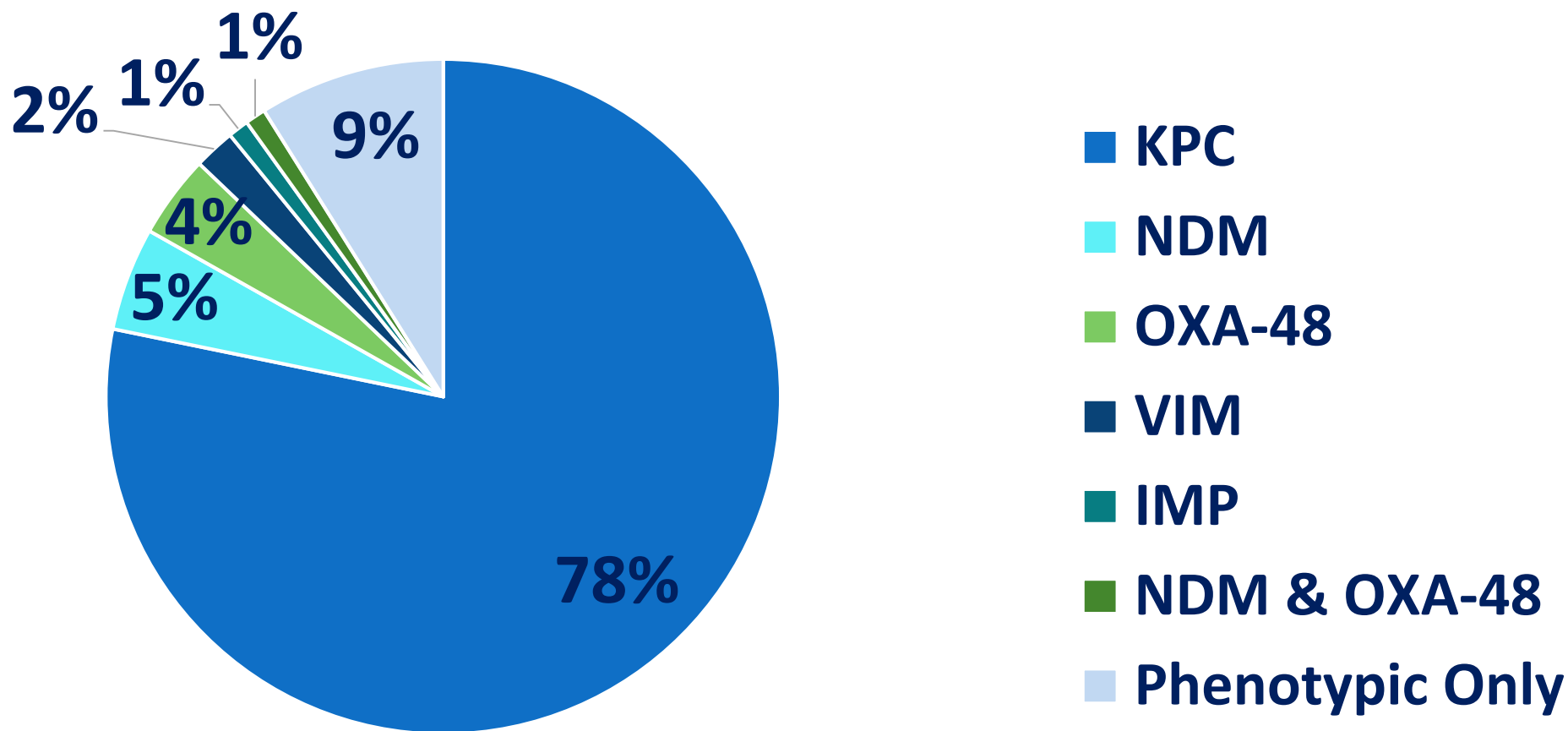
CP-CRE Cases by Organism

Jan 2018 – Mar 2019

Organism	CP-CRE Cases		
	Confirmed (n=189)	Suspect (n=234)	Total (n=423)
<i>Klebsiella spp.</i>	126 (67%)	95 (41%)	221 (52%)
<i>Klebsiella pneumoniae</i>	118	73	191
<i>Klebsiella aerogenes</i>	4	15	19
<i>Klebsiella oxytoca</i>	3	7	10
<i>Klebsiella variicola</i>	1	0	1
<i>Enterobacter spp.</i>	36 (19%)	68 (29%)	104 (25%)
<i>Enterobacter cloacae</i>	36	66	102
<i>Enterobacter asburiae</i>	0	1	1
<i>Enterobacter hormaechei</i>	0	1	1
<i>Escherichia coli</i>	27 (14%)	71 (30%)	98 (23%)

Confirmed CP-CRE Cases by Mechanism

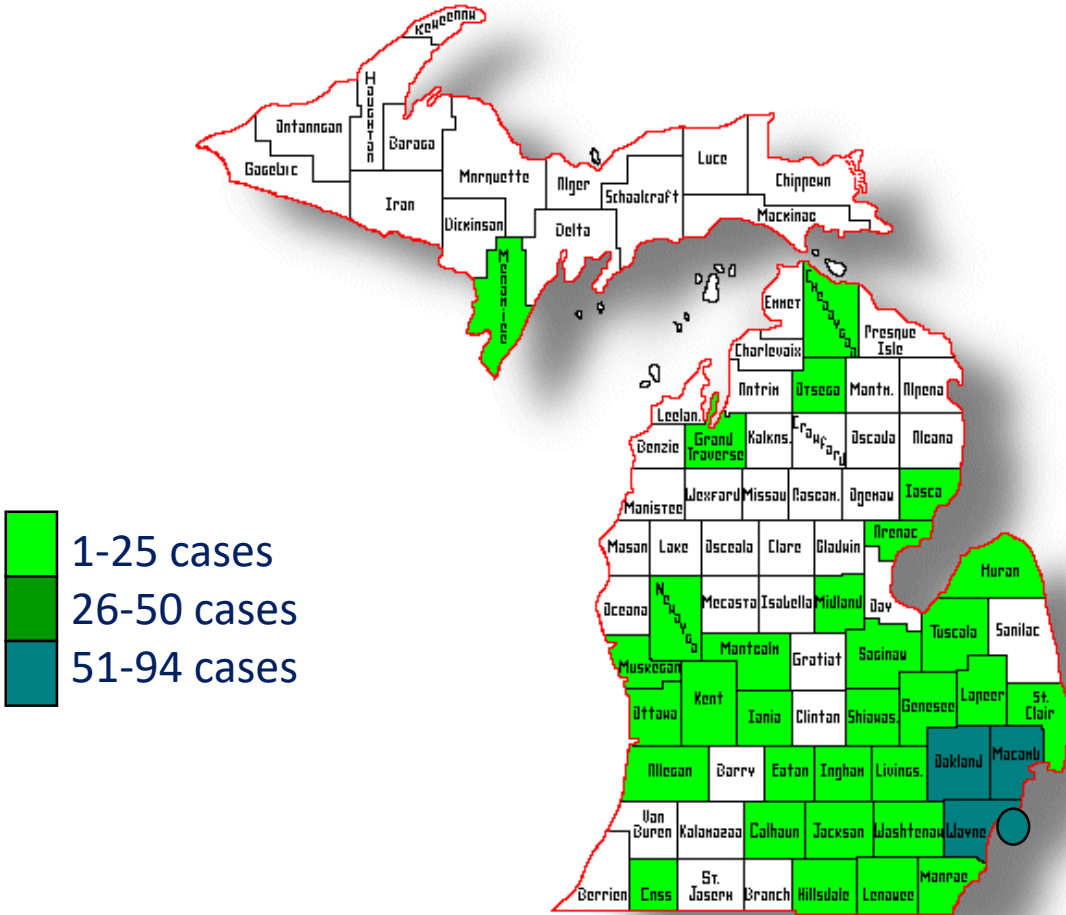
Jan 2018 – Mar 2019



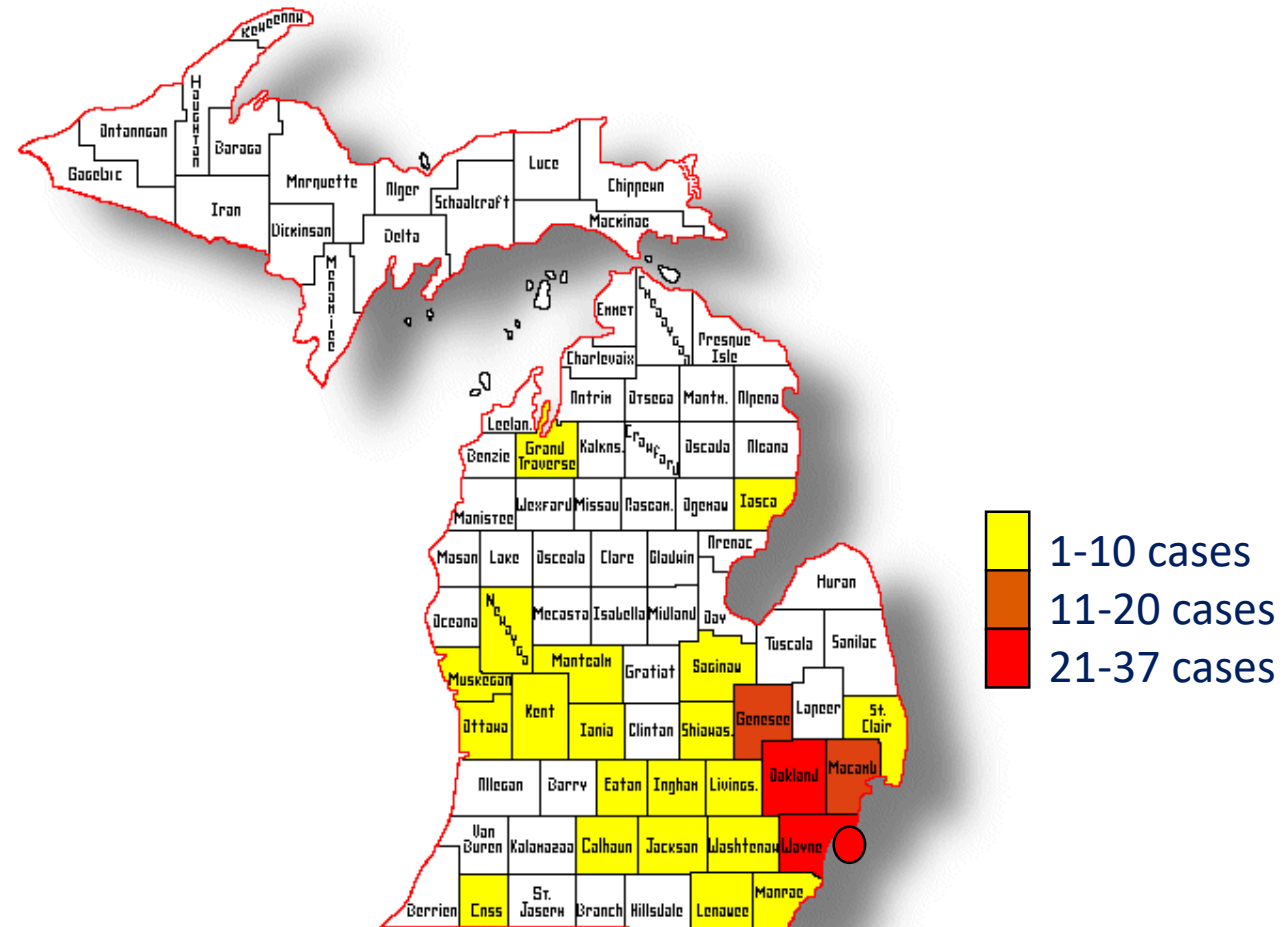
CP-CRE Cases by County

Jan 2018 – Mar 2019

Confirmed and Suspect CP-CRE



Confirmed CP-CRE only



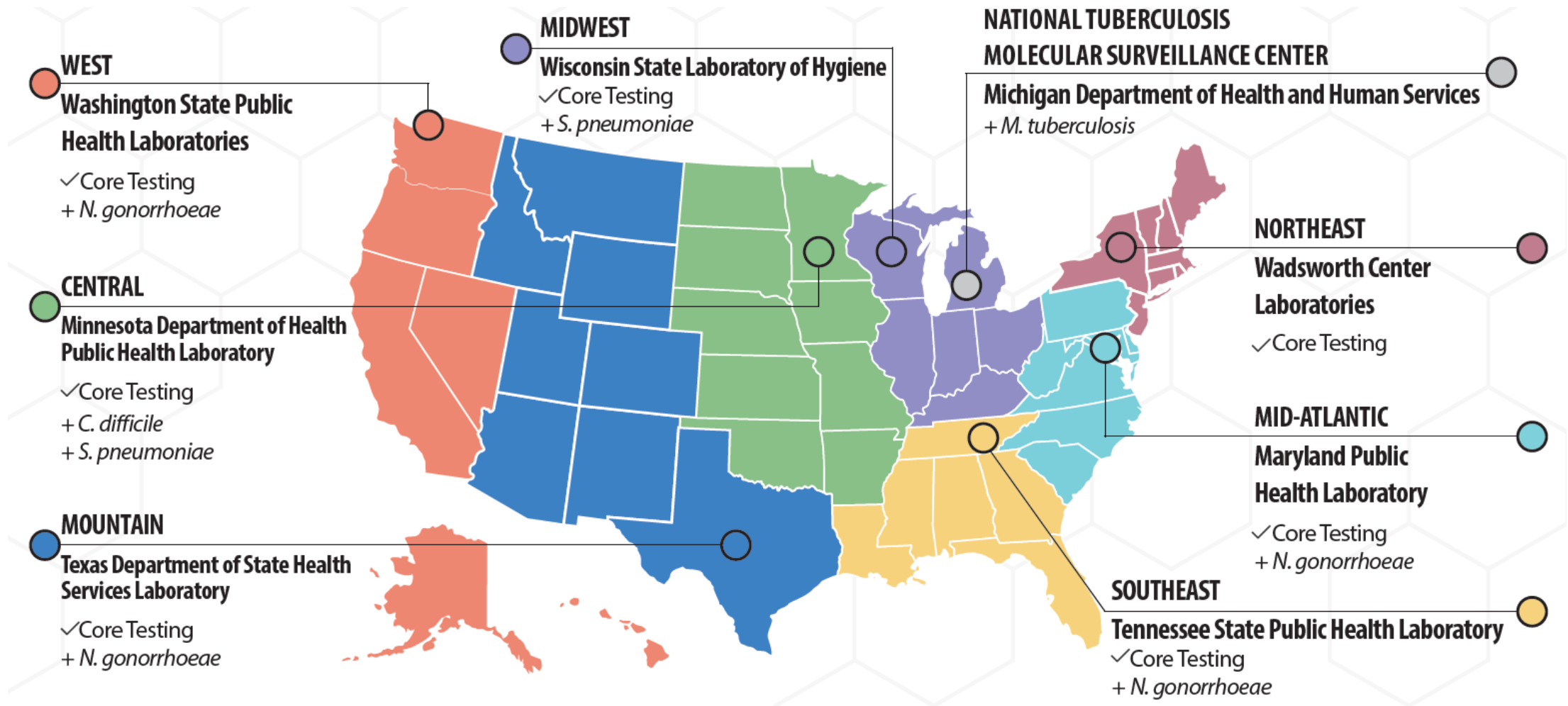
*based on county of residence

MDHHS Bureau of Laboratories/ ARLN Testing

MDHHS BOL Carbapenemase and Resistance Mechanism Testing

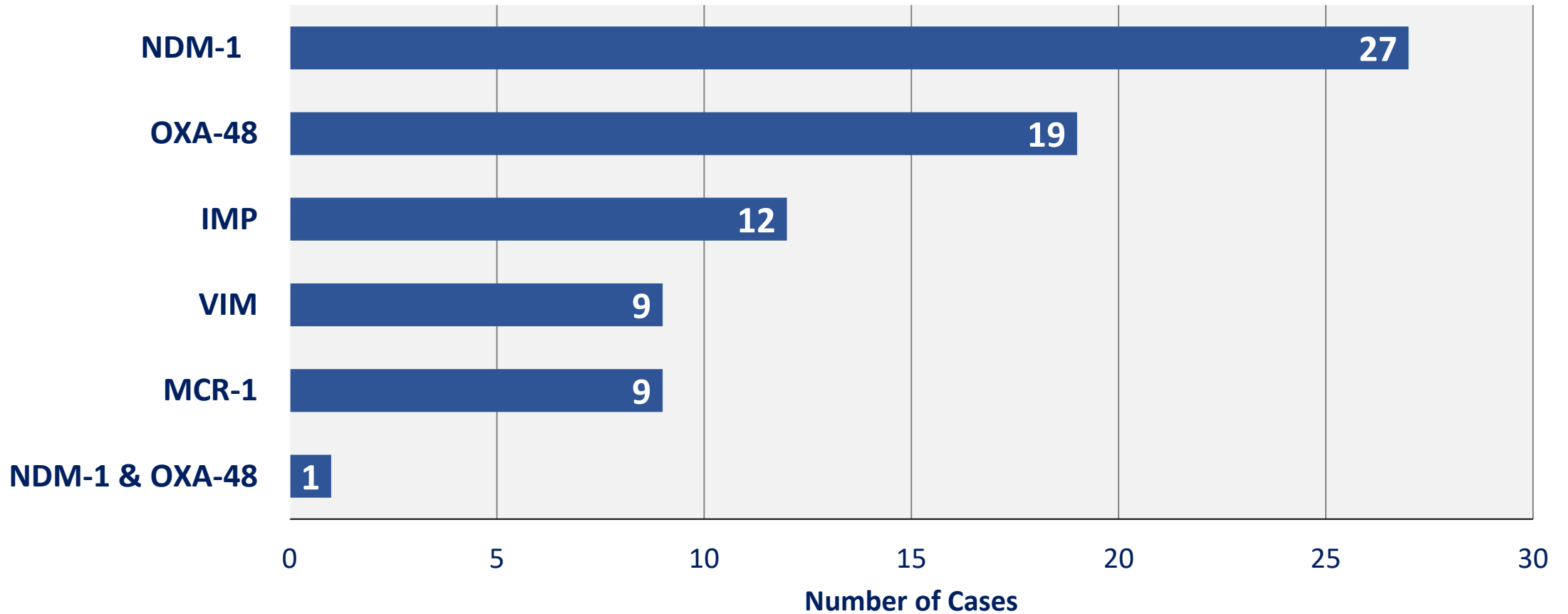
- Laboratories are *strongly encouraged* to submit *Enterobacteriaceae*, *Pseudomonas aeruginosa*, and *Acinetobacter spp.* isolates that are:
 - Non-susceptible to carbapenems
 - Resistant to colistin
 - Pan non-susceptible
- Colonization screening for CP-CRE

Antibiotic Resistance Laboratory Network (ARLN) Testing

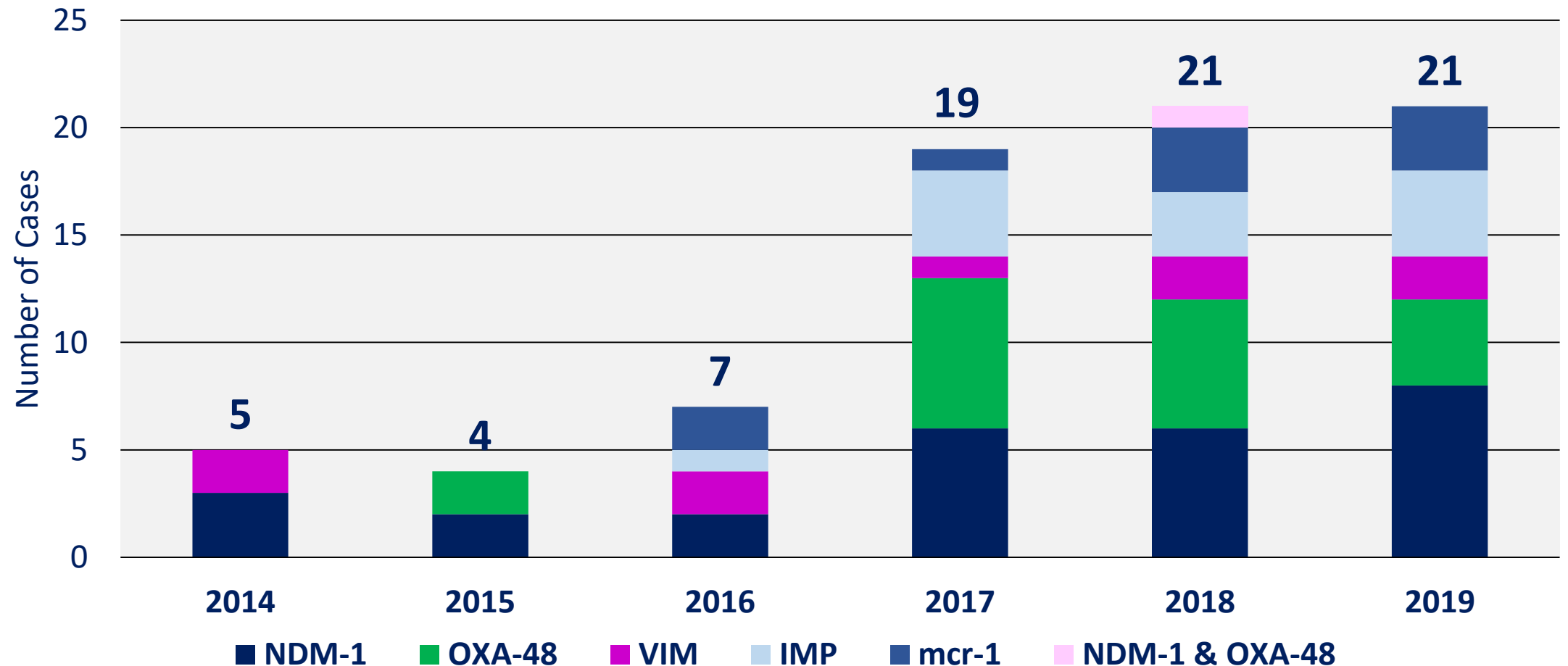


Confirmed Novel Resistance Cases

2014 - Current



Confirmed Novel Resistance Cases by Year



Novel Resistance Mechanisms by Organism

Organism	NDM-1	OXA-48	NDM-1 & OXA-48	VIM	IMP	mcr-1	Total
<i>Escherichia coli</i>	16	8				4	28
<i>Klebsiella pneumoniae</i>	8	11	1				20
<i>Enterobacter cloacae</i>	1			3	4		8
<i>Pseudomonas aeruginosa</i>				5			5
<i>Providencia rettgeri</i>					5		5
<i>Proteus mirabilis</i>	1				2		3
<i>Salmonella</i> Enteriditis						3	3
<i>Salmonella</i> Infantis						2	2
<i>Morganella morgannii</i>	1				1		2
<i>Klebsiella aerogenes</i>				1			1
<i>Citrobacter freundii</i>	1						1

Novel Resistance Case Demographics



Median Age, 63 yrs

(range 5 – 87 yrs)



Female, 40 (52%)



Comorbid conditions

Cardiovascular disease – 38%

Diabetes – 35%

Chronic lung disease – 17%

Renal failure, chronic wound – 20%

Malignancy – 13%

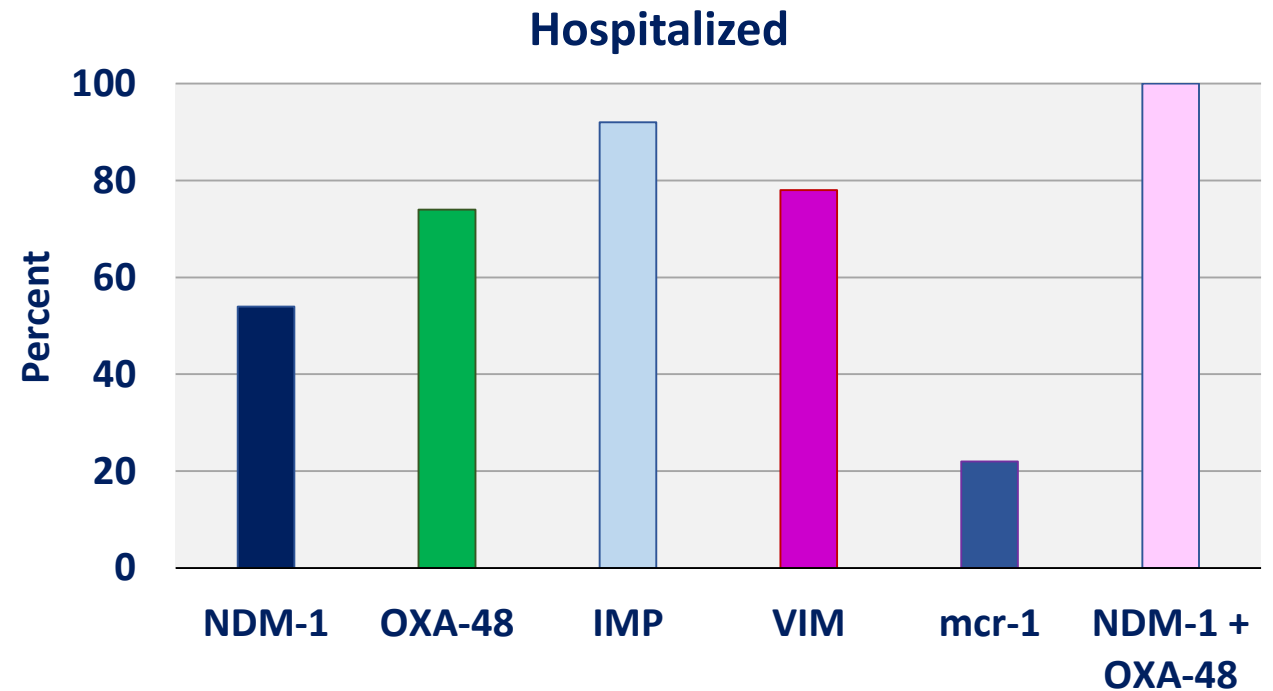
Urinary catheter – 12%

Vent dependent -11%

Dementia - 7%

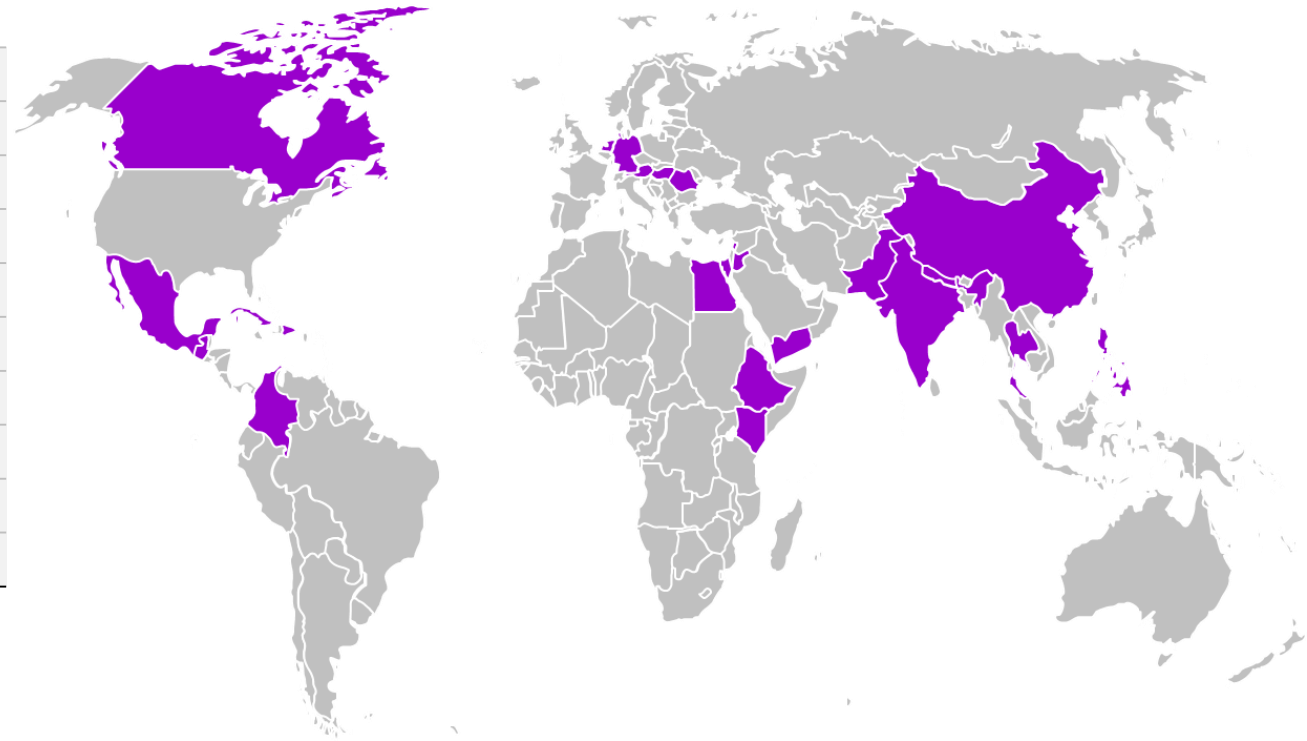
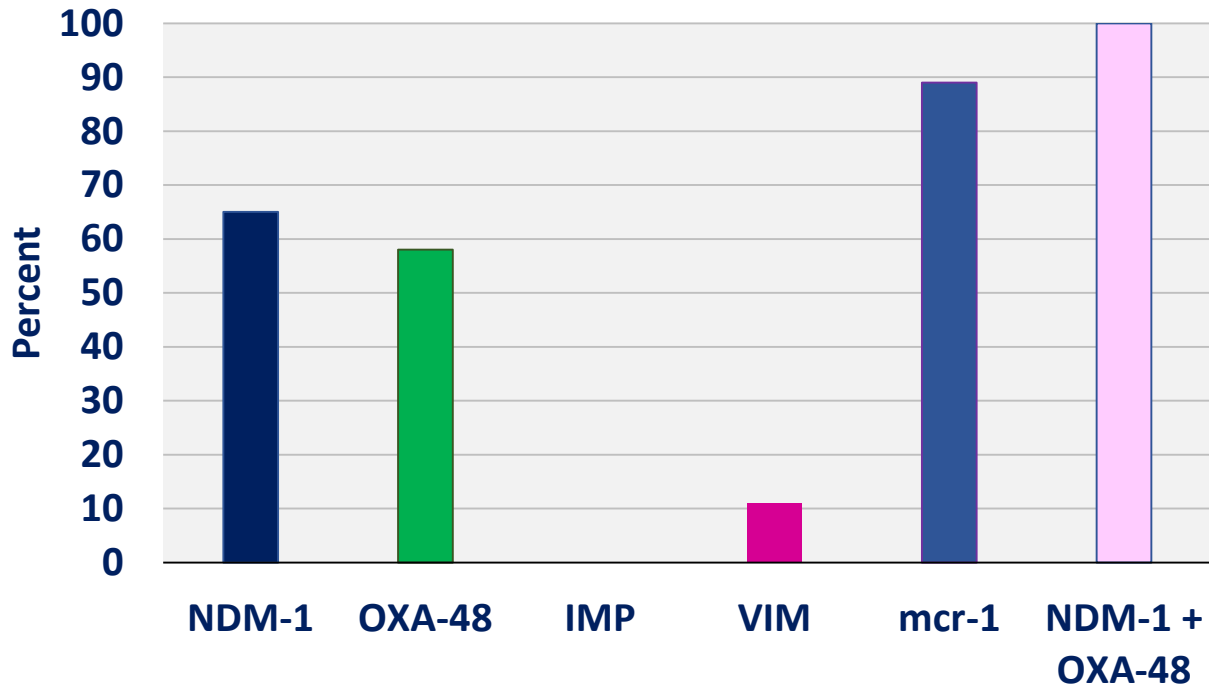
Prior Healthcare Exposures

- 64% were hospitalized 6 months prior to positive culture
 - 58% hospitalized in US
 - 20% hospitalized outside US



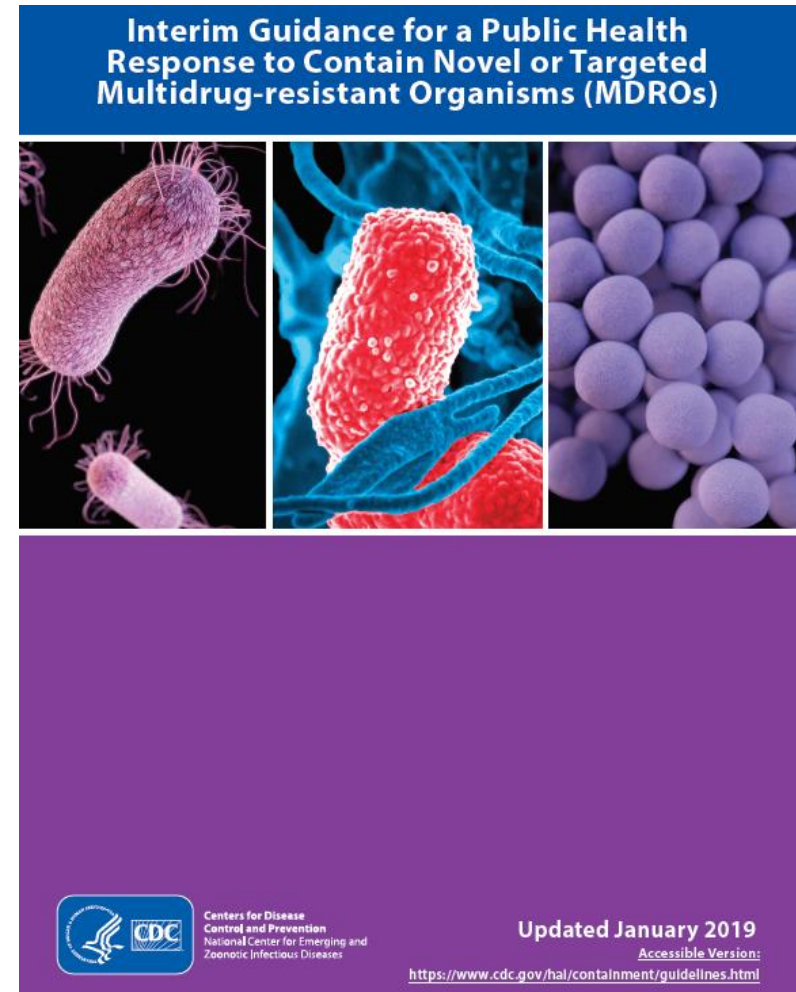
International Travel

- 50% had travel 6 months prior to positive culture



CDC Guidance for Novel MDRO Containment

- Response to a **single case** of resistance
- Goal to slow the spread of novel or unusual MDROs or resistance mechanisms
- Healthcare Contact Investigation
 - Notification/communication of status
 - Prompt implementation of precautions
 - Screening roommates
 - Screening broader healthcare contacts
 - Prospective and retrospective lab surveillance
 - Assessment of infection control practices



<https://www.cdc.gov/hai/containment/guidelines.html>

Containment Response Activities

- Provided consultation to 57 different healthcare facilities
- Collection of colonization screens of healthcare contacts
 - 15 cases
 - 17 healthcare facilities
 - 154 screening samples collected for CP-CRE and tested at MDHHS BOL
 - All samples negative except 3 (re-screens index cases only)
 - 2 screening samples collected for *C. auris* and tested through ARLN
 - Both samples negative



Thank You

**Surveillance for Healthcare Associated and Resistant Pathogens (SHARP) Unit
Michigan Department of Health and Human Services (MDHHS)
(517) 335-8165**

